CLAIMS

We claim:

1. A method of roughening a ceramic surface comprising forming mechanical interlocks in said ceramic surface by pattern etching said ceramic surface through a mask using a chemical etchant.

2. The method of Claim 1, wherein said ceramic is selected from the group consisting of alumina, quartz, aluminum nitride, silicon carbide, silicon nitride, boron carbide, and combinations thereof.

3. The method of Claim 1, wherein said mechanical interlocks have a diameter within the range of about 30 μm to about 300 μm.

4. The method of Claim 1, wherein said mechanical interlocks have a depth within the range of about 1 μm to about 40 μm.

5. The method of Claim 1, wherein said mechanical interlocks have a diameter to depth ratio within the range of about 5 : 1 to about 50 : 1.

6. The method of Claim 1, wherein the spacing between adjacent mechanical interlocks is within the range of about 200 μm to about 700 μm.

7. The method of Claim 1, wherein said mechanical interlocks are undercut.

8. The method of Claim 1, wherein said ceramic surface is pattern etched by forming a patterned mask over said ceramic surface, then immersing said masked ceramic surface in a solution of an acid selected from the group consisting of H_2SO_4, H_3PO_4, HF, $K_2S_2O_4$, V_2O_5, $Na_2B_4O_7$, KOH, and combinations thereof.

9. A method of roughening a ceramic surface comprising forming mechanical interlocks in said ceramic surface using a thermal etching process.

10. The method of Claim 9, wherein said ceramic is selected from the group consisting of alumina, quartz, aluminum nitride, silicon carbide, silicon nitride, boron carbide, and combinations thereof.

11. The method of Claim 9, wherein said ceramic surface is thermally etched by exposing said ceramic surface to a temperature below the sintering temperature of said ceramic.

12. The method of Claim 11, wherein said ceramic surface is thermally etched by exposing said ceramic surface to a temperature within the range of about 200°C to about 500°C below the sintering temperature of said ceramic.

13. The method of Claim 12, wherein said ceramic surface is exposed to a temperature about 200°C to about 500°C below the sintering temperature of said ceramic for a time period within the range of about 20 minutes to about 6 hours.

14. The method of Claim 11, wherein said ceramic surface comprises alumina, and said alumina is thermally etched by exposing said alumina to a temperature within the range of about 1250°C to about 1500°C, for a time period within the range of about 30 minutes to about 4.5 hours.

15. A method of roughening a ceramic surface comprising forming mechanical interlocks in said ceramic surface using a laser system which includes optics for producing a patterned beam.

16. The method of Claim 16, wherein said ceramic is selected from the group consisting of alumina, quartz, aluminum nitride, silicon carbide, silicon nitride, boron carbide, and combinations thereof.

17. The method of Claim 16, wherein said mechanical interlocks have a diameter within the range of about 30 μm to about 100 μm.

18. The method of Claim 16, wherein said mechanical interlocks have a depth within the range of about 10 μm to about 50 μm.

19. The method of Claim 16, wherein said mechanical interlocks have a diameter to depth ratio within the range of about 2 : 1 to about 3 : 1.

20. The method of Claim 16, wherein said mechanical interlocks are undercut.

21. The method of Claim 16, wherein said laser system is a high power, UV pulsed laser system.

22. A component for use within a semiconductor processing chamber, wherein said component has at least one ceramic surface which has mechanical interlocks formed therein.

23. The component of Claim 22, wherein said ceramic is selected from the group consisting of alumina, quartz, aluminum nitride, silicon carbide, silicon nitride, boron carbide, and combinations thereof.

24. The component of Claim 22, wherein said mechanical interlocks are formed in said at least one ceramic surface by a process selected from the group consisting of a chemical etching process, a thermal etching process, and a laser micromachining process.

25. The component of Claim 22, wherein said mechanical interlocks are undercut.

26. The component of Claim 22, wherein a layer of a sacrificial material overlies said ceramic surface.

27. The component of Claim 26, wherein said sacrificial material is aluminum.

28. The component of Claim 27, wherein said aluminum layer has a thickness within the range of about 76 μm to about 1.5 mm.

29. The component of Claim 26, wherein said component includes a bond coat layer between said ceramic surface and said sacrificial material layer.

30. The component of Claim 29, wherein said bond coat layer comprises a material having a coefficient of thermal expansion which is no more than about 20% higher or lower than the coefficient of thermal expansion of said ceramic.

31. The component of Claim 29, wherein said ceramic comprises alumina, and said bond coat layer comprises a material selected from the group consisting of tantalum, rhenium, molybdenum, chromium, titanium, platinum, nickel, manganese, and combinations thereof.

32. The component of Claim 31, wherein said bond coat layer comprises tantalum, and said tantalum layer has a thickness within the range of about 7.6 μm to about 38 μm.

33. A deposition ring for use within a physical vapor deposition chamber, wherein said deposition ring has at least one ceramic surface which has mechanical interlocks formed therein.

34. The deposition ring of Claim 33, wherein said ceramic is selected from the group consisting of alumina, quartz, aluminum nitride, silicon carbide, silicon nitride, boron carbide, and combinations thereof.

35. The deposition ring of Claim 33, wherein said mechanical interlocks are formed in said at least one ceramic surface by a process selected from the group consisting of a chemical etching process, a thermal etching process, and a laser micromachining process.

36. The deposition ring of Claim 33, wherein said mechanical interlocks are undercut.

37. The deposition ring of Claim 33, wherein a layer of a sacrificial material overlies said ceramic surface.

38. The deposition ring of Claim 37, wherein said sacrificial material is aluminum.

39. The deposition ring of Claim 38, wherein said aluminum layer has a thickness within the range of about 76 μm to about 1.5 mm.

40. The deposition ring of Claim 37, wherein said deposition ring further includes a bond coat layer between said ceramic surface and said sacrificial material layer.

41. The deposition ring of Claim 40, wherein said bond coat layer comprises a material having a coefficient of thermal expansion which is no more than about 20% higher or lower than the coefficient of thermal expansion of said ceramic.

42. The deposition ring of Claim 40, wherein said ceramic comprises alumina, and said bond coat layer comprises a material selected from the group consisting of tantalum, rhenium, molybdenum, chromium, titanium, platinum, nickel, manganese, and combinations thereof.

43. The deposition ring of Claim 42, wherein said bond coat layer comprises tantalum, and said tantalum layer has a thickness within the range of 7.6 μm to about 38 μm.